

## WAVELENGTH DIVISION MULTIPLEXING AND DE-MULTIPLEXING SYSTEM

## ABSTRACT

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A multiplexing system (1000) and de-multiplexing system (1100) which may both use the same wavelength division multiplexing (WDM) device (1006, 1106). For multiplexing, light sources (1002) provide a plurality of light beams (1004) having different light wavelengths to the WDM 1106, which forms a single output light beam 1008. For de-multiplexing, a light source  
10 (1102) provides a light beam (1104) having a plurality of different light wavelengths to the WDM 1106, which forms a plurality of output light beams 1108 each having respective of the light wavelengths. The WDM devices (1006, 1106) may particularly be formed from optically multi-dimensional planar gratings and cubical gratings which may diffract single wavelengths, sets of wavelengths, and ranges of wavelengths each with respect to one optical dimension  
15 present. The gratings may be discrete or integrated in multiplexing devices (1200, 1300), or they may be discrete or integrated in de-multiplexing devices (1400, 1500). Complex embodiments of the multiplexing system (1000), such as an interleaver (1700), and complex embodiments of the de-multiplexing system (1100), such as a de-interleaver (1600), can be forming blocks of the gratings.